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From Lula to Bolsonaro: The immediate impacts of elections on abnormal returns in B3-listed companies

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***Abstract*—** *Events not directly related to the operation of companies, such as elections and changes in laws, can influence the value of shares and impact the stock market as a whole. Considering the proximity of the Brazilian presidential election in 2022, and aiming to assess trends in the value of some shares and the Brazilian stock market, in this paper it is presented the analysis of the Accumulated Abnormal Returns on the value of common shares of large Brazilian companies after presidential elections. It is also presented the immediate reaction of the Brazilian Stock Market (B3). Eight companies were selected for the study, they are: Petrobras, Banco do Brasil, Vale, Itaúsa, Eletrobrás, Itaú Unibanco Holding and JBS. The criterion for this selection was based on the Forbes Global 2000 ranking published from 2008 to 2021, as will be detailed in the methodology. An Event Study was conducted to calculate the Accumulated Abnormal Returns (RAA) on the value of shares after the first round (event 1) and second round (event 2) of the presidential elections of 2002, 2006, 2010, 2014 and 2018. It was concluded that there were abnormal returns arising from the results of the presidential elections and some common shares were more impacted than others. In the joint view (first and second rounds of each election), Petrobras common shares were the only ones that presented a negative joint Accumulated Abnormal Return (RAA_c) after all presidential elections, in addition to obtaining the highest negative RAA_c. About the market reaction, captured through the analysis of the Ibovespa, it was observed that the result was negative in the first victory of Lula (2002), however, in his reelection (2006), it was obtained the highest positive result. Regarding the Bolsonaro election (2018), the Ibovespa ROA_c was 6.6%, being the most optimistic compared to the first election of Lula (2002) and Dilma (2010).*

I. INTRODUCTION

Factors unrelated to the operations of the companies cause disturbances in the stock market, one of these of great relevance is the political scenario of a country. During electoral campaigns and based on the prospectus of winners, impacts are noticed in the stock market and, in the market value of companies with shares in the Brazilian Stock Market (B3). This phenomenon is easy to understand qualitatively, considering that during political campaigns it is possible to identify promises related to privatization, tax reform, labor reform, social security reform, and many others. These promises, if fulfilled, will culminate in increased or decreased spending for companies operating in the country, attractiveness for private capital investments in specific sectors of the economy, and so on. Thus, the result of the presidential elections generates expectations and uncertainties that cause changes in the value of stocks that are divergent from those that would be generated due to the normal movements of the stock market. It is from these unforeseen variations that the abnormal returns in stock value are calculated. In this context, this research is delimited to the quantitative evaluation of the impacts of the Brazilian presidential elections of 2002, 2006, 2010, 2014 and 2018 on the common stock price of eight large Brazilian companies, which were selected based on the Forbes Global 2000 ranking published in the period from 2008 to 2021. The cumulative abnormal returns of each stock were calculated using the Event Study methodology, and the events analyzed were the first and second rounds of each election. Additionally, the joint impact (first and second rounds) on the value of each share and the Accumulated Observed Return of Ibovespa after each round and in the joint view were calculated and analyzed.

II. LITERATURE REVIEW

According to Brealey, Myers, & Allen (2011), and Nasdaq (2021), abnormal returns are a portion of a stock's return that is not due to the price movement of the market as a whole. In other words, it is the difference between the current return and that which is expected due to market movements (normal return).

In the literature there are several studies about events that cause variations in stock prices and that can generate opportunities for attentive investors. In Costa, Galdi, & Nossa (2013), the authors suggest that it is possible to set up an investment strategy in a period immediately after an airplane crash. According to the authors, an area of studies known as behavioral finance reveals that certain situations can generate misperceptions of reality. Costa, Galdi, & Nossa (2013), apud Kaplanski and Levi (2010), found evidence that after an air crash there are losses of more than $ 60 billion in the market value of companies while it is estimated that the actual loss is no more than $1 billion. The price reversal occurs in approximately two days.

Other research has evaluated abnormal returns arising from the involvement of companies in scandals, such as Costa, Souza, Duval, Pimenta, & Rosa (2017), which analyzed the impact of Operation Weak Meat on the shares of some large meatpacking plants targeted by this investigation; and Bastos, Rosa, & Pimenta (2016), which evaluated the impact of Operation Lava Jato and the 2014 global oil crisis on Petrobras shares.

In Smith & Aggarwal (2015), the authors analyzed the impact of U.S. presidential election cycles over a period of more than forty years on more than seventy industries and concluded that by observing who is ahead in the polls ninety days before the presidential election, they could plot investment strategies and earn significant abnormal returns. The authors listed several articles that showed abnormal returns earned by companies in the face of presidential election results and pointed out that this phenomenon is observed in several countries. Still on presidential elections, Jacob Júnior & Souza (2020) evaluated the impacts of the 2018 elections in Brazil on the share price of Banco do Brasil, Bradesco, and Santander, with one of their conclusions being that investors in these companies earned higher than expected returns as a result of the elections. Schmidt, Martin, & Quadrado (2020) analyzed the abnormal returns of Petrobras, Banco do Brasil, and Eletrobras in the 2018 elections and concluded that the first two had less relevant abnormal returns when compared to those observed in Eletrobras shares.

In Salazar (2007), the author evaluated the phenomenon of abnormal returns arising from the inclusion and exclusion of stocks in the theoretical portfolio of the Bovespa Index (Ibovespa). This is the main indicator of the average performance of stock quotes traded on B3. The index is calculated on a theoretical portfolio of stocks that corresponds to about 80% of the financial volume of the capital market, and is re-evaluated every four months. The author concluded that "the re-evaluation of the Bovespa Index Theoretical Portfolio has informational content because the event of its publication guides the market to invest or not in the stocks that experience the mentioned inclusion and exclusion occurrences".

Other authors have also evaluated abnormal stock returns arising from the disclosure of accounting results of the companies, as can be seen in Sarlo Neto (2004), and Sarlo Neto, Galdi, & Dalmácio (2009); and, more comprehensively, they also evaluated the impacts of news

published in the Valor Econômico newspaper on the value of stocks, as can be consulted in Ferrer (2008). In all these cases it was possible to verify the existence of correlation between the events and the reflection on the share prices of the companies involved.

It can be seen, therefore, that there are several studies that have found the existence of abnormal returns on the value of the shares of certain companies as a result of various events.

III. THEORETICAL BACKGROUND

An event study consists of evaluating the impacts of a given event on the stock value of a given company. According to Campbell, Lo, & MacKinlay, p. 149 (1998), the technique has been widely used in academia to assess the most diverse events such as company mergers, publication of earnings, changes in the regulatory environment, and others. The analysis of impacts of a given event can be conducted following the steps:

1) Definition of the event: consists in determining the event of interest and identifying the period in which the values of the shares will be evaluated. This period is known as the event window. According to Campbell, Lo, & MacKinlay, p. 151 (1998), generally the event window is expanded to a period of two days, the day of the announcement and the subsequent day.

2) Definition of the selection criterion: this is the criterion used to include a particular company in the study.

3) Normal return and abnormal return calculation: To evaluate the impact of an event it is necessary to measure the abnormal return. This return is observed after the event. The normal return, on the other hand, is the one expected if the event does not occur. The Stock Return, $R_{i,t}$, and the Market Return, R_m, can be calculated according to Sarlo Neto, p. 120 (2004) as:

$$R_{i,t} = \frac{P_{i,t} - P_{i,t-1}}{P_{i,t-1}}, \quad (1)$$

$$R_{m,t} = \frac{Ind_t - Ind_{t-1}}{Ind_{t-1}}, \quad (2)$$

where:

$R_{i,t}$: is the rate of return of stock i in period $[t,t\text{-}1]$;

$P_{i,t}$: is the price of share i at date t;

$P_{i,t-1}$: is the price of share i at date $t\text{-}1$;

$R_{m,t}$: is the market rate of return in period $[t, t\text{-}1]$;

Ind_t: is the value of the market index (Ibovespa) at date t;

Ind_{t-1}: is the value of the market index (Ibovespa) at date $t\text{-}1$.

To calculate the normal return it will be used the market model, presented in (3), where α_i and β_i are calculated by linear regression of the returns of a stock, $R_{i,t}$, and the market rate of return, $R_{m,t}$, using the Ordinary Least Squares (OLS) method.

$$R_{i,t} = \alpha_i + \beta_i R_{m,t} + e_{i,t}, \quad (3)$$

where:

α_i: is the intercept obtained by liner regression for company i;

β_i: is the coefficient of variation obtained by linear regression for company i;

$e_{i,t}$: is the error obtained in the linear regression for company i;

Once the parameters α_i and β_i have been calculated, the expected returns for a stock in a given period can be calculated using (4).

$$E[R_{i,t}] = \alpha_i + \beta_i R_{m,t}, \quad (4)$$

where:

$E[R_{i,t}]$: is the normal return (expected return) of stock i in period t according to the market line.

Finally, the difference between the observed return of stock i in period t, $R_{i,t}$, and the expected return, $E[R_{i,t}]$, is the Abnormal Return for firm i in period t, $RA_{i,t}$, as per (5).

$$RA_{i,t} = R_{i,t} - E[R_{i,t}], \quad (5)$$

The Accumulated Abnormal Return (RAA) is defined by (7) and represents the accumulated abnormal percentage change in the observation window after the event. In the literature it is also referred to as Buy and Hold Abnormal Return (BHAR), as can be seen in Dutta & Dutta, p. 28 (2015), and Barber & Lyon, p. 4, (1997).

$$RAA = Accumulated\ Observed\ Return - Accumulated\ Expected\ Return,$$

$$RAA = ROA - REA. \quad (6)$$

Algebraically, (6) can be written according to (7):

$$RAA = \prod_{t=1}^{N}(1 + R_{i,t}) - 1 - \left[\prod_{t=1}^{N}(1 + E[R_{i,t}]) - 1\right],$$

$$RAA = \prod_{t=1}^{N}(1 + R_{i,t}) - \prod_{t=1}^{N}(1 + E[R_{i,t}]), \quad (7)$$

where:

RAA: is the Accumulated Abnormal Return in the observation window after the event;

t: is a sample for which the abnormal return is being calculated. It assumes values from 1 to *N*, covering the entire observation window after the event;

N: represents the last sample of the observation window after the event.

Fig. *1* shows a temporal scheme of an Event Study, which is composed of three intervals: the estimation window, which is the reference interval for calculating the parameters α_i and β_i used in the calculation of the expected return; the event window, which is the interval of occurrence of the observed event; and the post-event window, which is the interval where the expected stock returns will be compared with the obtained returns, i.e., it is the window for calculating the abnormal returns.

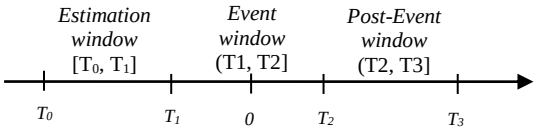

Fig. 1: Timeline for an Event Study.

4) Estimation procedure: to estimate abnormal returns it is necessary to classify what is normal return. The normal return is estimated using a data set from the estimation window. The estimation window should not contain the event window, in order to avoid influence of the event on the estimation of the normal return. This window is chosen before the event window and in the literature it is possible to verify the use of different periods. In Costa, Galdi, & Nossa (2013) the authors used, as an estimation window, sixty closing prices of the stock before the date of the accident. In Costa, Souza, Duval, Pimenta, & Rosa (2017), the estimation window was thirty days before the date of the event.

5) Test procedure: with the defined parameters for calculating the normal return, the next step is to calculate the abnormal returns according to (6).

6) Presentation of results, interpretation and conclusions: data analysis and discussion step.

IV. METHODOLOGY

To develop this research, an event study was conducted following the steps detailed in the theoretical background. The first and second rounds of the presidential elections of 2002, 2006, 2010, 2014, and 2018 were established as events to be analyzed.

The sample consisted of the eight publicly traded companies that between 2008 and 2021 were most often listed in the Forbes Global 2000 ranking among the twelve largest companies in Brazil. This ranking has been published since 2003 and is based on four criteria: sales, profit, assets, and market value, to indicate which are the two thousand largest publicly traded companies in the world. For simplification purposes, only the common shares of the companies were evaluated.

Table 1 shows the selected companies and the number of times each of them was among the twelve largest in Brazil in the 14-year period comprised from 2008 to 2021.

Table 1: Selected companies.

Company	Recurrences
Petrobras (PETR3)	14
Banco Bradesco (BBDC3)	14
Banco do Brasil (BBAS3)	14
Vale (VALE3)	14
Itaúsa (ITSA3)	14
Eletrobrás (ELET3)	11
Itaú Unibanco Holding (ITAU3/ITUB3)[1]	10
JBS (JBSS3)[2]	10

Note 1: The founding of Itaú Unibanco Holding S.A. (ITUB3) took place in 2008, with the merger of Banco Itaú and Unibanco, thus, prior to 2008 it was evaluated the impacts of the presidential elections on Banco Itau (ITAU3).

Note 2: The historical quotes of JBS are available starting in 2007, thus the impacts of presidential elections on this company were evaluated only in the 2010, 2014, and 2018 elections.

After selecting the companies, the **closing values** of the historical prices of the common shares and Ibovespa were obtained by consulting databases available on the website https://br.investing.com. Due to the normal volatility and fluctuation of stock prices in one day, it was decided to calculate and present the **accumulated returns** in the post-event window.

The parameter estimation window was defined as one hundred and twenty stock closing prices preceding the date of the presidential election in the first round. The parameters α_i and β_i of the market model, (3), were calculated in the estimation window using the Microsoft Excel® Data Analysis tool to run the linear regressions by the Ordinary Least Squares method. In all regressions the

T-test of Student was performed. The null hypothesis of the T test is that the parameter associated with the independent (or explanatory) variable is equal to zero. This hypothesis can be rejected if the *t* modulus is greater than two. The P value associated with each of the T-tests was also checked. In all cases, the parameters where the null hypothesis was rejected with a significance equal to or less than 5% (P- value < 5%) were considered. Appendix A presents a summary of the results obtained in the linear regressions to determine α and β.

The event window corresponds to the election date in each year. This window was defined as only one day because price variations in the shares were verified sometimes higher than 7% already in the first quotation after the election. That is, immediately after the election, it was observed an influence on the price of some stocks.

Both the first and second rounds of the elections of 2002, 2006, 2010, 2014, and 2018 were evaluated, so in each election two events were analyzed. Table 2 shows the dates of the presidential elections held since 2002, the candidates for the second round, those who were elected (highlighted in bold), their respective political parties, and the percentage of votes they obtained in each round.

Table 2: Summary of presidential election results from 2002 to 2018.

Year	Round	Candidate	Political party	Votes (%)
2002	First 10/06/2002	Luiz Inácio Lula da Silva	PT[3]	46,44
		José Serra	PSDB[4]	23,19
	Second 10/27/2002	**Luiz Inácio Lula da Silva**	PT	61,27
		José Serra	PSDB	38,72
2006	First 10/01/2006	Luiz Inácio Lula da Silva	PT	48,61
		Geraldo Alckmin	PSDB	41,64
	Second 10/29/2006	**Luiz Inácio Lula da Silva**	PT	60,83
		Geraldo Alckmin	PSDB	39,17
2010	First 10/03/2010	Dilma Rousseff	PT	46,91
		José Serra	PSDB	32,61
	Second 10/31/2010	**Dilma Rousseff**	PT	56,05
		José Serra	PSDB	43,65
2014	First 10/05/2014	Dilma Rousseff	PT	41,59
		Aécio Neves	PSDB	33,55
	Second 10/26/2014	**Dilma Rousseff**	PT	51,64
		Aécio Neves	PSDB	48,36
2018	First 10/07/2018	Jair Bolsonaro	PSL[5]	46,03
		Fernando Haddad	PT	29,28
	Second 10/28/2018	**Jair Bolsonaro**	PSL	55,13
		Fernando Haddad	PT	44,87

Source: https://pt.wikipedia.org/

[3]PT: Party of the Workers (*Partido dos Trabalhadores*).

[4]PSDB: Brazilian Social Democracy Party (*Partido da Social Democracia Brasileira*).

[5]PSL: Social Liberal Party (*Partido Social Liberal*).

The post-event window, in which abnormal returns are calculated, was defined as seven stock closing prices after each event window, that is, after the dates of the first and second rounds. Table 3 shows a summary of the parameters defined for the event studies developed in this research.

Table 3: Parameters used in the Event Study.

Event definition	Event 1: first round of the Brazilian presidential elections from 2002 to 2018. Event 2: second round of the Brazilian presidential elections from 2002 to 2018.
Criterion for selection of the companies	Eight most recurrent companies among the twelve largest in Brazil according to the Forbes Global 2000 ranking in the period between 2008 and 2021.
Estimation window	One hundred and twenty closing prices of shares that precede the date of the presidential elections in the first round.
Evenw window	Window of event 1: day of the first round of voting; Window of event 2: day of the second round of voting.
Post-event window	Window 1: seven closing prices of shares after the first round of voting; Window 2: seven closing prices of shares after the second round of voting.

It is necessary to emphasize that it was not verified if there were other events that occurred simultaneously to the presidential elections and that may have caused some impact on the prices of the shares of the evaluated companies. To minimize this possibility of interference from other events, the estimation window was defined close to the event of interest and the observation period (pos-event window) is a short interval soon after the event

of interest. Furthermore, the methodology applied has a limitation concerning the analysis of simultaneous events since there is no way to predict the percentage of impact attributed to more than one event if they occur simultaneously.

To evaluate the market reaction to the results of the presidential elections in the first and second rounds, the Accumulated Observed Return of the market index, ROA_m defined by (8), was calculated in the intervals after the events. The market index used was the Ibovespa.

$$ROA_m = \prod_{t=1}^{N}(1 + R_{m,t}) - 1 \quad (8)$$

Finally, the joint Accumulated Abnormal Return, RAA_c, is given by (11):

$$ROA_c = (1 + ROA_{1^\circ t})(1 + ROA_{2^\circ t}) - 1, \quad (9)$$

$$REA_c = (1 + REA_{1^\circ t})(1 + REA_{2^\circ t}) - 1, \quad (10)$$

$$RAA_c = ROA_c - REA_c, \quad (11)$$

where:

ROA_c: is the joint Acumulated Observed Return. It represents the cumulative observed impact of the first and second shifts on the stock price;

REA_c: is the joint Accumulated Expected Return. It represents the cumulative expected impact of the first and second shifts on the stock price;

$ROA_{x^\circ t}$: is the Accumulated Observed Return after round x°. x = 1 or 2; and

$REA_{x^\circ t}$: is the Accumulated Expected Return after round x°. x = 1 or 2.

V. RESULTS AND DISCUSSIONS

After calculating the parameters α_i and β_i, it was found that the intercept, α_i, proved to be non-significant for all models, i.e., equal to zero (α_i= 0). This means that the fixed rate of return can be disregarded in the models. Moreover, in the subsequent data analyses, it must be clear that:

- Whenever only mentioned 'expected return', 'observed return', 'abnormal return', 'expected increase', 'expected decrease', these expressions are referring to the values accumulated in the post-event windows;
- JBSS3 shares have a historical record of share prices only from 2007 onward, which is the year the company entered the B3. Thus, only the impacts after 2007 on the stock value were evaluated.

Evaluation of impact on common shares

Table 4 shows *β, ROA*, *REA* and *RAA* after the first and second rounds. It is also presented the joint impact of the two rounds of each election on the analyzed common shares. In the 'Pos.' column there is a sequence in descending order of absolute value of the *RAA*. Finally, it is possible to consult the accumulated observed return of the Ibovespa after each round and in the joint view.

Elections of 2002

The linear regression with VALE3 prices in the estimation window returned parameters α and β with p-value greater than 5%, therefore, not significant. Thus, the returns of these common shares were not calculated in 2002.

It was found that in the historical quotes of ITSA3 in 2002 there are only 115 days of stock prices recorded. In the same year, there are 249 days in which the Ibovespa value is recorded, so, for some unknown reason, there are no records of the historical quotes of this common share on all business days in 2002. Given the scarcity of data, the estimation window (120 quotations prior to the date of the first round) reached the year 2001. Additionally, while the second round of elections took place on 10/27/2002, the first record of quotations after this date is from 11/04/2002, i.e. there was a gap of quotations from 10/28/2002 to 11/01/2002, a period fully comprised in the post-event window of the second round. In order to not distort the analysis due to this gap, ITSA3 returns in 2002 were not calculated.

It was also noted that there were only 184 quotations for ITAU3 in 2002. Additionally, in this year the first round occurred on 10/06/2002 and while Ibovespa has historical data from 10/07/2002, the first ITAU3 quote is from 10/09/2002, that is, only three days after the election date. It was also verified that until 10/15/2002, Ibovespa had seven historical values after the date of the event. For ITAU3, this post-event window closed only on 10/24/2002. In order to not distort the analysis due to these information gaps, the returns of ITAU3 in 2002 were not calculated.

In the first round, Lula and Serra were selected to run in the second with 46.44% and 23.19% of the votes, respectively. After the results of the first round, PETR3 showed *ROA* of -16.34%, the largest drop observed that year, being -9.12% the abnormal return, also the largest in absolute value. In a joint analysis of the returns in the first and second rounds, PETR3 had -20.3% ROA_c, being -11.8% the RAA_c this year. Among the stocks analyzed, in 2002 PETR3 was the one that presented the greatest impact in the combined view of the two rounds, followed by BBAS3.

In this year Lula was elected for his first mandate and the market reacted negatively, presenting a ROA_c of -9.5%.

Elections of 2006

It was observed that the regression statistics indicated the coefficient β significant (P-value < 5%), however, the R^2 parameter was very low, in the order of 5%. Thus, there must be other models that better represent the variations in the ITSA3 share price in 2006. For this reason, the returns of this stock in the year were not calculated.

In the first round, Lula and Alckmin were elected to run in the second with 48.61% and 41.64% of the votes, respectively. With these results, PETR3 had the most negative *RAA* (-6.98%) and BBAS3 the most positive (3.26%). Lula was elected in the second round and, in a view of the accumulated impact of the two rounds, PETR3 was again the stock that presented the highest negative accumulated abnormal return (RAA_c = -8.2%).

This year Lula was elected for a second mandate and the market reacted positively, presenting ROA_c of 11.5%, the most positive reaction in the five elections analyzed.

Elections of 2010

Dilma and Serra were selected with 46.91% and 32.61% of the votes, in that order, to dispute the second round. Facing these results ELET3 presented the highest *RAA* (12.11%) and PETR3 the lowest (-8.42%). Dilma was elected for her first term in office and, on the combined impact view, PETR3 presented the most negative RAA_c for the third consecutive election (-4.7%) and ELET3 presented RAA_c equal to 9.2%, which was the highest in these elections.

The stock market reacted positively with Dilma's election, with ROA_c of Ibovespa equal to 3.5%.

Elections of 2014

Dilma and Aécio were chosen with 41.59% and 33.55% of the votes, in that order, to run in the second round. Facing this result, JBSS3 presented the most negative RAA_c (-3.20%) and BBAS3 the most positive (19.21%). In the second round Dilma was elected and PETR3 was for the fourth time the stock with the most negative RAA_c (-16.8%). On the other extreme, BBAS3 had RAA_c equal to 27.1%, which was the highest in this election.

Ibovespa reacted positively to Dilma's reelection and the joint accumulated observed return was equal to 11.4%, the second most positive reaction of this indicator among the five elections analyzed.

Elections of 2018

In 2018 Bolsonaro and Haddad were selected in the first round with 46.03% and 29.28% of the votes, respectively. In this scenario, the highest and lowest *RAA* were 6.19% and -1.72% of JBSS3 and ITSA3, respectively. With Bolsonaro's election in the second round the biggest joint impacts in absolute value were on JBSS3 (10.4%) and BBDC3 (7.2%). This year the market reacted positively, presenting ROA_c of 6.6%.

To present a concise view of the stocks that were most influenced by the election results, in Table 5 the five highest positive and the five highest negative abnormal returns were consolidated after the first and second rounds and in the combined view. PETR3 led among the most negatively impacted stocks occupying three of five positions after the first round, two of five positions after the second round and three of five positions in the joint impact.

Regarding the three highest positive *RAA*, BBAS3 was the stock that presented the highest values after the first round, second round and in the combined view.

To verify the companies less influenced by the election result in the global view, the joint accumulated abnormal return with an absolute value equal to or less than 2% ($|RAA_c| \leq 2\%$) was classified as neutral. The stocks that fell within this range were VALE3 in 2006 (0.2%), ELET3 in 2018 (-0.7%), and VALE3 in 2010 (1.3%).

Evaluation of impact on Ibovespa

Error! Reference source not found. Thus, the first victory of Lula represented at the time a rupture in ideologies and in the governing plan for the country. In this scenario, it is believed that this partisan discontinuity may be contributed to the fall of Ibovespa soon after the election result and the *ROAc* was equal to -9.5% this year.

In 2006 and 2014, in the re-elections of Lula and Dilma, the *ROAc* was 11.5% and 11.4%, respectively, which were the most positive immediate reactions of the stock market. It is believed that the continuity of government ideologies influenced this positive result.

Table ***6*** shows the candidates selected in each round of elections, the accumulated observed return on Ibovespa, ROA_m, and the joint impact, ROA_c, calculated according to (8) and (9), respectively.

Only in 2002, in Lula's first victory, which was also the first victory of a PT-affiliated presidential candidate, the reaction of the stock market was negative. Before this election, Brazil had been presided over by Fernando Henrique Cardoso since 1995, who was a member of the PSDB and whose PT was in opposition.

Table 4: Abnormal returns per election and in order of decreasing absolute value of RAA in the second round.

			After first round				After second round				Joint view		
Year	**Company**	***β***	***ROA* (%)**	***REA* (%)**	***RAA* (%)**	***Pos.***	***ROA* (%)**	***REA* (%)**	***RAA* (%)**	***Pos.***	***ROA*$_c$ (%)**	***REA*$_c$ (%)**	***RAA*$_c$ (%)**
	Banco do Brasil	1,153	-4,90	-9,36	4,46	3°	5,77	-1,82	7,58	1°	0,6	-11,0	11,6
	Eletrobras	1,112	-8,13	-9,02	0,89	4°	2,26	-1,74	4,00	2°	-6,1	-10,6	4,6
	Petrobras	0,887	-16,34	-7,22	-9,12	1°	-4,70	-1,34	-3,36	3°	-20,3	-8,5	-11,8
	Itaú	NA*	NA*				NA*				NA*		
2002	Bradesco	0,839	-12,96	-6,84	-6,12	2°	-3,57	-1,26	-2,31	4°	-16,1	-8,0	-8,1
	Itaúsa	NA*	NA*				NA*				NA*		
	Vale	NA*	NA*				NA*				NA*		
	JBS	NA*	NA*				NA*				NA*		
	Ibovespa (BVSP)	NA*	-8,13	NA*			-1,54	NA*			-9,5	NA*	
	Itaúsa	NA*	NA*				NA*				NA*		
	Itaú	1,069	7,22	6,47	0,75	5°	-1,14	5,46	-6,60	1°	6,0	12,3	-6,3
	Bradesco	0,834	6,20	5,04	1,16	3°	-0,64	4,25	-4,88	2°	5,5	9,5	-4,0
	Eletrobras	1,298	9,03	7,88	1,15	4°	2,81	6,65	-3,84	3°	12,1	15,0	-3,0
2006	Petrobras	0,913	-1,46	5,52	-6,98	1°	3,69	4,65	-0,96	4°	2,2	10,4	-8,2
	Banco do Brasil	1,212	10,61	7,35	3,26	2°	5,60	6,20	-0,60	5°	16,8	14,0	2,8
	Vale	1,005	6,24	6,08	0,16	6°	5,16	5,13	0,037	6°	11,7	11,5	0,2
	JBS	NA*	NA*								NA*		
	Ibovespa (BVSP)	NA*	6,05	NA*			5,1	NA*			11,5	NA*	
	Petrobras	0,902	-6,57	1,86	-8,42	2°	5,37	1,23	4,13	1°	-1,5	3,1	-4,7
	Itaú Unibanco	0,969	4,79	1,99	2,80	5°	4,49	1,32	3,17	2°	9,5	3,3	6,2
	Eletrobras	0,699	13,55	1,44	12,11	1°	-1,74	0,96	-2,70	3°	11,6	2,4	9,2
	Bradesco	0,921	4,88	1,90	2,98	4°	3,84	1,26	2,58	4°	8,9	3,2	5,7
2010	Vale	1,242	1,42	2,55	-1,13	8°	4,11	1,69	2,42	5°	5,6	4,3	1,3
	JBS	0,944	-0,79	1,94	-2,74	6°	-0,53	1,29	-1,82	6°	-1,3	3,3	-4,6
	Itaúsa	0,623	2,90	1,29	1,62	7°	2,23	0,86	1,38	7°	5,2	2,2	3,0
	Banco do Brasil	0,942	6,49	1,94	4,55	3°	2,16	1,29	0,87	8°	8,8	3,3	5,5
	Ibovespa (BVSP)	NA*	2,06	NA*			1,37	NA*			3,5	NA*	
	Petrobras	1,996	16,68	12,51	4,17	3°	-9,26	9,04	-18,30	1°	5,9	22,7	-16,8
	Vale	0,531	4,09	3,41	0,68	8°	-12,17	2,54	-14,71	2°	-8,6	6,0	-14,6
	JBS	1,186	4,33	7,54	-3,20	4°	12,92	5,54	7,38	3°	17,8	13,5	4,3
	Eletrobras	1,432	11,34	9,06	2,28	6°	-0,33	6,63	-6,96	4°	11,0	16,3	-5,3
2014	Itaú Unibanco	0,994	8,81	6,33	2,47	5°	10,92	4,68	6,25	5°	20,7	11,3	9,4
	Banco do Brasil	1,380	27,95	8,74	19,21	1°	11,63	6,40	5,23	6°	42,8	15,7	27,1
	Bradesco	1,272	8,81	8,07	0,74	7°	10,40	5,92	4,47	7°	20,1	14,5	5,7
	Itaúsa	1,061	25,19	6,75	18,43	2°	5,45	4,98	0,47	8°	32,0	12,1	19,9
	Ibovespa (BVSP)	NA*	6,37	NA*			4,7	NA*			11,4	NA*	
	Petrobras	1,570	11,01	6,47	4,55	3°	-2,69	3,57	-6,26	1°	8,0	10,3	-2,2
	Banco do Brasil	1,728	11,13	7,09	4,04	4°	-2,27	3,90	-6,17	2°	8,6	11,3	-2,7
	Bradesco	1,381	6,91	5,72	1,20	6°	8,72	3,16	5,56	3°	16,2	9,1	7,2
	Eletrobras	1,889	13,07	7,72	5,35	2°	-1,27	4,23	-5,51	4°	11,6	12,3	-0,7
2018	Itaú Unibanco	0,939	4,48	3,93	0,55	7°	7,18	2,19	4,99	5°	12,0	6,2	5,8
	Itaúsa	0,996	2,44	4,16	-1,72	5°	6,46	2,32	4,14	6°	9,1	6,6	2,5
	JBS	0,590	8,68	2,49	6,19	1°	5,16	1,39	3,77	7°	14,3	3,9	10,4
	Vale	0,570	2,28	2,41	-0,13	8°	3,58	1,35	2,23	8°	5,9	3,8	2,1
	Ibovespa (BVSP)	NA*	4,18	NA*			2,33	NA*			6,6	NA*	

*NA: not applicable or not calculated;

ROA: Accumulated Observed Return;

REA: Accumulated Expected Return;

REA$_c$: Joint Accumulated Expected Return;

RAA$_c$: Joint Accumulated Abnormal Return.

RAA: Accumulated Abnormal Return;

ROA$_c$: Joint Accumulated Observed Return;

Table 5: Five highest positive abnormal returns and five highest negative abnormal returns.

	Position	*RAA* after 1° round (Share/Year/Value %)			*RAA* after 2° round (Share/Year/Value %)			RAA_c Share/Year/Value %)		
(+)	1°	BBAS3	2014	19,2	BBAS3	2002	7,6	BBAS3	2014	27,1
	2°	ITSA3	2014	18,4	JBSS3	2014	7,4	ITSA3	2014	19,9
	3°	ELET3	2010	12,1	ITUB3	2014	6,2	BBAS3	2002	11,6
	4°	JBSS3	2018	6,2	BBDC3	2018	5,6	JBSS3	2018	10,4
	5°	ELET3	2018	5,3	BBAS3	2014	5,2	ITUB3	2014	9,4
(-)	1°	PETR3	2002	-9,1	PETR3	2014	-18,3	PETR3	2014	-16,8
	2°	PETR3	2010	-8,4	VALE3	2014	-14,7	VALE3	2014	-14,6
	3°	PETR3	2006	-7,0	ELET3	2014	-7,0	PETR3	2002	-11,8
	4°	BBDC3	2002	-6,1	ITAU3	2006	-6,6	PETR3	2006	-8,2
	5°	JBSS3	2014	-3,2	PETR3	2018	-6,3	BBDC3	2002	-8,1

Thus, the first victory of Lula represented at the time a rupture in ideologies and in the governing plan for the country. In this scenario, it is believed that this partisan discontinuity may be contributed to the fall of Ibovespa soon after the election result and the ROA_c was equal to -9.5% this year.

In 2006 and 2014, in the re-elections of Lula and Dilma, the ROA_c was 11.5% and 11.4%, respectively, which were the most positive immediate reactions of the stock market. It is believed that the continuity of government ideologies influenced this positive result.

Table 6: Accumulated Observed Return on the Ibovespa (ROA_m) immediately after the presidential elections.

	After 1st round		After 2nd round		Joint view
Year	**Candidates**	ROA_m **(%)**	**Elected**	ROA_m **(%)**	ROA_c **(%)**
2002	Lula (46,44%) Serra (23,19%)	-8,13	Lula (61,27%)	-1,54	-9,5
2006	Lula (48,61%) Alckmin (41,64%)	6,05	Lula (60,83%)	5,10	11,5
2010	Dilma (46,91%) Serra (32,61%)	2,06	Dilma (56,05%)	1,37	3,5
2014	Dilma (41,59%) Aécio (33,55%)	6,37	Dilma (51,64%)	4,70	11,4
2018	Bolsonaro (46,03%) Haddad (29,28%)	4,18	Bolsonaro (55,13%)	2,33	6,6

In 2018, Bolsonaro was elected president and at that time he was a member of the PSL, a party that was in opposition to PT. Thus, there was again a major ideological discontinuity of government. At that time, the country was also going through strong political instability with the arrest of former president Lula and the interruption of Dilma's mandate through impeachment. In this unstable scenario, after the victory of Bolsonaro the ROA_c was equal to 6.6% and represented a positive reaction from the stock market. It is believed that this ideological discontinuity contributed to this positive result right after the election.

VI. CONCLUSION

In this research the Accumulated Abnormal Returns, *RAA*, of the common shares of eight Brazilian companies immediately after the presidential elections of 2002, 2006, 2010, 2014, and 2018 were calculated and analyzed. The companies that were most often listed among the twelve largest in Brazil according to the Forbes Global 2000 ranking, published annually from 2008 to 2021, were selected for the analysis, and they are: Petrobras (PETR3), Bradesco (BBDC3), Eletrobras (ELET3), Banco do Brasil (BBAS3), Vale (VALE3), Itaúsa (ITSA3), Itaú (ITAU3/ITUB3) and JBS (JBSS3). The events analyzed were the first and second rounds of each presidential election, as well as the joint (cumulative) impact of the two rounds on stock returns. Additionally, to verify the reaction of the Brazilian stock market to the election results, the accumulated observed return of Ibovespa,

ROA_m, was calculated and analyzed after each round and in the combined view.

Regarding the joint impact after each election, PETR3 was the only stock that presented a negative joint Accumulated Abnormal Return, RAA_c, in all elections. The three most negative RAA_c were those of PETR3 (-16.8%), VALE3 (-14.6%) and PETR3 (-11.8%) after the 2014, 2014 and 2002 elections, respectively. At the other extreme, the stocks that presented the three highest RAA_c were BBAS3 (27.1%), ITSA3 (19.9%) and BBSA3 (11.6%), in 2014, 2014 and 2002, in that order. VALE3, on the other hand, in 2006 and 2010, and ELET3 in 2018, presented RAA_c with an absolute value of less than 2%, as can be seen in Table 5, and were the stocks least impacted by the election results considering the joint impact of both rounds.

With regard to the influence of the election results on Ibovespa, it was found that in 2002, the year Lula was elected for his first term, the joint Accumulated Observed Return, ROA_c, of this index was -9.5%, being 2002 the only presidential election in which Ibovespa's ROA_c was negative. On the other hand, the highest ROA_c was 11.5%, after the 2006 election (the year Lula was reelected), and 11.4% in 2014 (the year Dilma was reelected). Thus, the Brazilian stock market reacted pessimistically in Lula's first election, somewhat optimistically in the election of Dilma (ROA_c = 3.5%), the country's first female president, and quite optimistically in the reelections of Lula and Dilma. In 2018, with the first election of Bolsonaro, the ROA_c of Ibovespa was 6.6%, signaling an optimistic reaction of the market, which was not as expressive as the elections of 2006 and 2014, however, it was the most optimistic when compared to the first election of Lula (2002 / -9.5%) and Dilma (2010 / 3.5%).

As future research, it is suggested to categorize companies into sectors (agribusiness, financials, energy, etc.) and evaluate the impact of the presidential elections on each sector individually. Another suggestion consists in verifying the impacts of elections on companies in the same sector, but with different capital structures, e.g., companies where the government is the controlling shareholder versus companies where the government is not the controlling shareholder.

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APPENDIX A

Company	Year	R^2	Intercept			Coefficient of variation		
			α	Stat t	P-Value	β	Stat t	P-Value
Petrobras (PETR3)	2002	0,405865	0,000916	0,412085	0,681024	0,886948	8,978197	5,19E-15
	2006	0,542967737	5,04705E-05	0,037689	0,969999	0,913253111	11,84008	8,54E-22
	2010	0,402705297	-0,001606082	-1,12557	0,26263	0,901986329	8,919497	7,12E-15
	2014	0,801476	0,000359	0,307982	0,758639	1,996169	21,82626	3,04E-43
	2018	0,39138359	0,001889895	0,736557	0,462854	1,569870904	8,711049	2,19E-14
Bradesco (BBDC3)	2002	0,408947	-0,00114	-0,546779248	0,585562899	0,839265	9,035683585	3,80307E-15
	2006	0,41534	0,000216	0,136555318	0,891615004	0,834222	9,155691038	1,98712E-15
	2010	0,619501	0,001124	1,198893051	0,232971616	0,920761	13,86069491	1,61338E-26
	2014	0,730175	-0,00017	-0,183388843	0,854807673	1,272125	17,8695543	2,32198E-35
	2018	0,729382	-0,00061	-0,555550866	0,579569689	1,380621	17,83362743	2,76284E-35
Banco do Brasil (BBAS3)	2002	0,456299	0,000222	0,085188678	0,932255762	1,153472	9,951429365	2,61519E-17
	2006	0,455396	-0,0002	-0,096033693	0,92365672	1,211638	9,933341196	2,88681E-17
	2010	0,476743	0,000803	0,625942419	0,532561588	0,9423	10,36872964	2,66835E-18
	2014	0,526942	0,000546	0,355635881	0,722748232	1,379935	11,46476804	6,62143E-21
	2018	0,651544	0,000432	0,260631368	0,794831082	1,728291	14,85382993	8,76913E-29
Vale (VALE3)	2002	0,007876195	0,002598331	1,378663106	0,17060669	0,081034406	0,967868393	0,335089683
	2006	0,631836859	-0,000331858	-0,270665803	0,787120945	1,00498067	14,23060386	2,28597E-27
	2010	0,440111231	0,000752594	0,413612892	0,679908378	1,241949384	9,630999296	1,50249E-16
	2014	0,188593249	-0,001536531	-1,187063814	0,237586703	0,531241582	5,237026446	7,21111E-07
	2018	0,160314232	0,002546264	1,48916863	0,139110858	0,570020393	4,746447122	5,86444E-06
Itaúsa (ITSA3)	2002	0,063682458	0,001385933	1,352876226	0,178681663	0,088263217	2,832952755	0,005425599
	2006	0,055927181	0,000366644	0,151649773	0,879722143	0,329729951	2,643928594	0,00930903
	2010	0,217737952	0,000621357	0,399696423	0,69010269	0,623019629	5,731020216	7,79351E-08
	2014	0,474409341	0,000187148	0,14263845	0,886819001	1,061165643	10,32033513	3,47769E-18
	2018	0,496873088	-0,001300199	-0,990193364	0,324105728	0,995581915	10,79505768	2,58428E-19
Eletrobras (ELET3)	2002	0,588182936	-0,003699183	-1,918436244	0,057471685	1,112039875	12,98210283	1,75946E-24
	2006	0,541309913	-0,000592646	-0,310453802	0,756763566	1,297530965	11,80060618	1,05921E-21
	2010	0,291650667	5,74082E-05	0,040588287	0,967692717	0,698695455	6,970256279	1,94473E-10
	2014	0,44914262	-0,000890365	-0,478078515	0,633478827	1,431602141	9,808747418	5,69988E-17
	2018	0,373733164	0,000967763	0,301946302	0,763224525	1,8890511	8,391548625	1,20707E-13
Itaú/Itaú Unibanco Holding (ITAU3/ITUB3)	2002	0,218364224	-0,001093412	-0,44712348	0,655605536	0,580840414	5,74155504	7,42385E-08
	2006	0,522500949	0,000361411	0,220345848	0,825982591	1,068500598	11,36313822	1,15389E-20
	2010	0,616959958	0,000311742	0,314471837	0,753718044	0,968561415	13,78628984	2,39407E-26
	2014	0,653129194	3,12232E-05	0,036690228	0,970793998	0,99408658	14,90584762	6,69229E-29
	2018	0,605791327	-0,00022461	-0,226147765	0,821477754	0,939372479	13,46602578	1,31655E-25
JBS (JBSS3)	2010	0,326939116	-0,001026001	-0,583449982	0,560703943	0,943533851	7,570895819	9,03425E-12
	2014	0,366021202	0,001539982	0,83983479	0,40269939	1,18609234	8,253853529	2,51E-13
	2018	0,1386103	-3,52522E-05	-0,018297894	0,985432111	0,589639882	4,357515267	2,82356E-05